

Problem L: Milkman's Puzzle

One day Honest Joe, the milkman who is proud to claim that “what I don’t know about milk is scarcely worth mentioning,” was flabbergasted when he had only two ten-gallon cans full of milk and two customers with a five and a four quart measure wanted two quarts put into each measure.

Joe required quite a bit of cleverness that day to get exactly two quarts of milk into those measures employing no receptacles of any kind other than the two measures and the two full cans.



Moving the milk can be tricky

Consider the situation in which you have two cans full of milk, each can with a capacity of C quarts. Then two customers come to you with the following request: the first customer has an empty measure of M_1 quarts and wants exactly Q_1 quarts of milk in it, while the second customer has an empty measure of M_2 quarts, and wants Q_2 quarts of milk. What is the sequence of “moves” that can accomplish this task in the least number of steps?

One move corresponds to pouring milk from one container (a can or a measure) into another container until either the destination is full or the source is empty. Spilling milk or pouring a certain amount of milk that leaves both the source and destination containers partially full is not acceptable.

We will denote the two cans full of milk **a** and **b**, the measure from the first customer **c** and the measure from the second customer **d**. A move where milk is poured from a container x to a container y is denoted xy .

Input

Input starts with a positive integer **T**, that denotes the number of test cases.

Each test case is described in a line that contains five integers: **C**, **M₁**, **Q₁**, **M₂** and **Q₂**, in that order.

$$T \leq 1000 ; 1 \leq C \leq 50 ; 1 \leq Q_1 \leq M_1 \leq 20 ; 1 \leq Q_2 \leq M_2 \leq 20$$

Output

For each test case, print the case number, followed by the sequence of moves that leaves exactly Q_1 quarts of milk in **c** and Q_2 quarts of milk in **d** in the minimum number of steps.

Print a comma between two moves to separate them. If more than one sequence can solve the problem, print the lexicographically lowest alternative. If it’s not possible to fulfill the request, print **impossible**.

Sample Input	Output for Sample Input
3	Case 1: ac, cd, da, cd, ac, cd, da, bd, da
40 5 2 4 2	Case 2: ac, cd
40 4 2 2 2	Case 3: impossible
10 3 2 6 3	